

E 1.28: SOLAR/1013-78/10

Alpha 1214290

SOLAR/1013-78/10

Monthly Performance Report

J. D. EVANS

HOUSE B

OCTOBER 1978



U.S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

J. D. EVANS, INC.
HOUSE B

OCTOBER 1978

I. SYSTEM DESCRIPTION

J. D. Evans, Inc., House B is one of two instrumented single-family residences in Columbia, Maryland. The home has approximately 2250 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 374 square feet. The array faces south at an angle of 45 degrees to the horizontal. Water is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Solar energy is stored in the basement in a 1000-gallon steel storage tank. Incoming city water is preheated in a liquid-to-liquid heat exchanger located in the storage tank and then flows into a conventional 40-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a heat exchanger within a heat pump and an electrical heating element in the air-distribution duct provides auxiliary energy for space heating. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has three modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the temperature difference between the storage tank and the collector outlet is higher than 15°F. Water circulates from the storage tank through the collector until a temperature difference of less than 5°F is reached.

Mode 2 - Storage-to-Space Heating: This mode activates when thermal energy for space heating is requested by the room thermostat. Solar-heated water from storage circulates through a liquid-to-air heat exchanger in the space heating air duct. If solar energy is insufficient to satisfy the space heating load, the heat pump and/or the auxiliary electrical heating element will be activated. The electrical strip heater can also be manually operated without solar heating and heat pump operation.

Mode 3 - DHW Preheating: This mode is activated by drawing hot water from the system. Cold supply water is preheated in a liquid-to-liquid heat exchanger located in the solar energy storage tank before flowing to the DHW tank. If the required DHW tank temperature of 140°F is not maintained by solar preheating, auxiliary energy is provided by the electrical heating element in the DHW tank.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied in October and the solar energy system operated continuously during the month. DHW subsystem consumption of auxiliary energy was

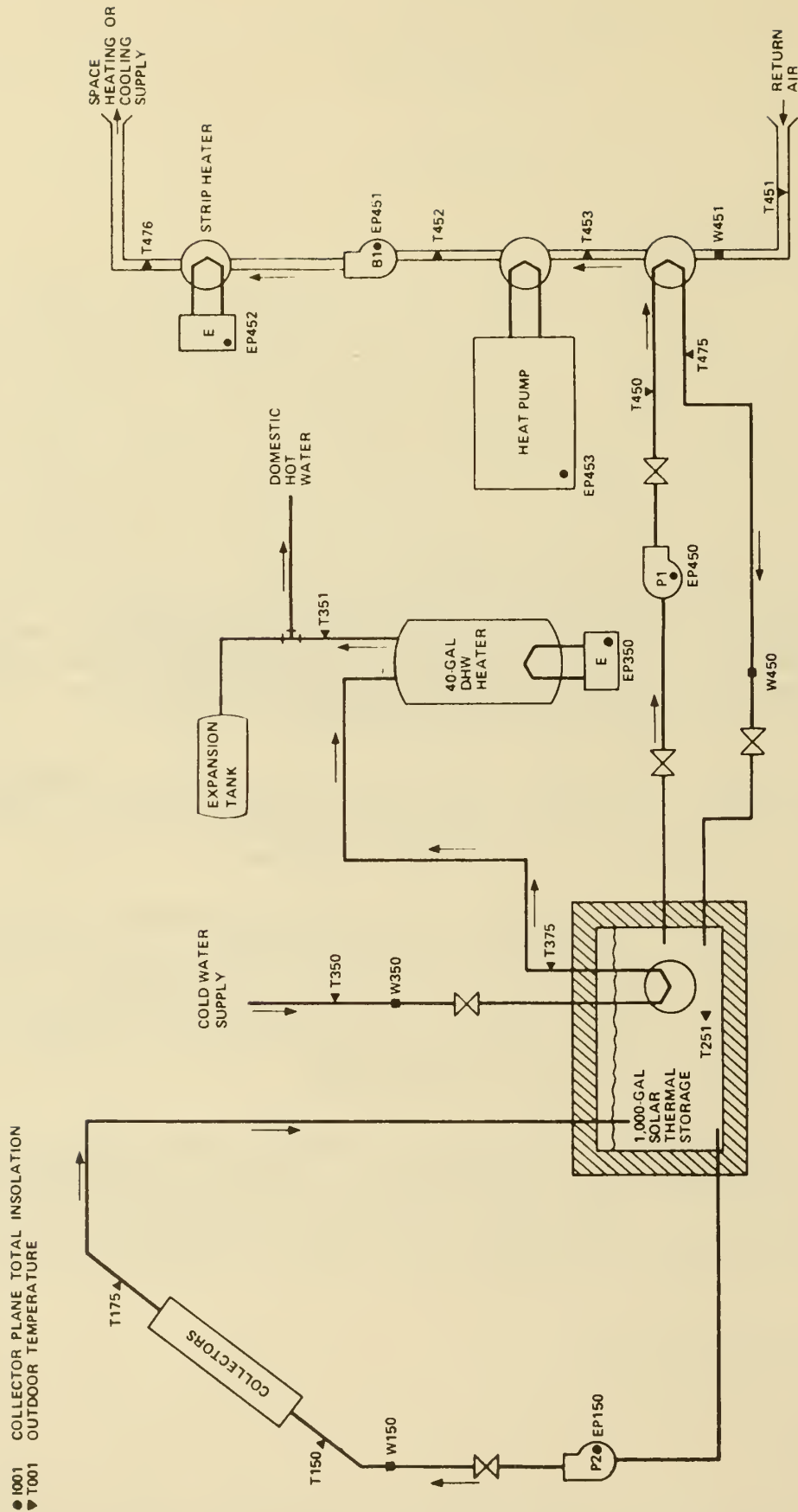


Figure 1. J. D. EVANS, INC., HOUSE B SOLAR ENERGY SYSTEM SCHEMATIC

not determined because of associated sensor problems. Solar energy satisfied 94 percent of the space heating requirements and an indeterminate amount of the DHW requirements. The solar energy system provided electrical energy savings of 0.79 million Btu.

The site was serviced by IBM/Boeing and the site grantee from October 9 through October 14. Some data was collected for October 9, but no data was collected for October 10 through October 14.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 17.3 million Btu for a daily average of 1493 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during October of 1545 Btu per square foot for a south-facing plane with a tilt of 45 degrees to the horizontal. The average ambient temperature during October was 51°F as compared with the long-term average for October of 57°F.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of October was 17.3 million Btu. There was no solar energy collected from October 1 through October 12, due to malfunction of the collector pump. During the period the collector loop was operating, the total insolation amounted to 10.3 million Btu. The total collected solar energy for the month of October was 2.1 million Btu, resulting in a collector array efficiency of 12 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 2.1 million Btu. Operational energy required by the collector loop was 0.11 million Btu.

Storage - Solar energy delivered to storage was 2.1 million Btu. There were 0.96 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 0.89 million Btu. This loss represented 42 percent of the energy delivered to storage. The storage efficiency was 58 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 146°F.

DHW Load - The DHW subsystem consumed 0.85 million Btu of solar energy and an indeterminate amount of auxiliary energy to satisfy a hot water load of 0.88 million Btu. The auxiliary electrical energy could not be determined because of problems with associated sensors. The DHW subsystem did not consume any operational energy, resulting in an electrical energy savings of 0.85 million Btu. A daily average of 62 gallons of DHW was consumed at an average temperature of 117°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 0.13 million Btu of solar energy and 0.003 million Btu of auxiliary electrical energy to satisfy a space heating load of 0.13 million Btu. The heat pump supplied 0.007 million Btu of energy. The solar fraction of the space heating load was 94 percent.

The space heating subsystem consumed a total of 0.007 million Btu of operating energy, resulting in an electrical energy savings of 0.068 million Btu. The average ambient temperature inside the house was 69°F.

OBSERVATIONS

The site was serviced between October 9 through October 14, during which period data transmission was interrupted.

ENERGY SAVINGS

The solar energy system provided a total electrical energy savings of 0.79 million Btu. The DHW subsystem provided an electrical energy savings of 0.85 million Btu, while the space heating subsystem contributed an electrical energy savings of 0.068 million Btu.

III. ACTION STATUS

Boeing is expected to schedule an investigation of the DHW auxiliary energy sensor.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND
 REPORT PERIOD: OCTOBER, 1978

SOLAR/1013-78/10

SITE/SYSTEM DESCRIPTION: THE INSTALLATION CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING A SINGLE J-BOX AND SDAS. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT SOLAR ASSISTED SYSTEMS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A 1000 GALLON STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS DOMESTIC HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND A HEAT PUMP, WHICH SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	17.313	MILLION BTU
COLLECTED SOLAR ENERGY	46293	BTU/SQ. FT.
AVERAGE AMBIENT TEMPERATURE	2.000	MILLION BTU
AVERAGE BUILDING TEMPERATURE	5588	BTU/SQ. FT.
ECSS SOLAR CONVERSION EFFICIENCY	51	DEGREES F
ECSS OPERATING ENERGY	69	DEGREES F
TOTAL SYSTEM OPERATING ENERGY	0.06	MILLION BTU
TOTAL ENERGY CONSUMED	0.107	MILLION BTU
	0.115	MILLION BTU
	*	MILLION BTU

SUBSYSTEM SUMMARY:

LOAD	HOT WATER	COOLING
SOLAR FRACTION USED	0.879	N.A.
OPERATING ENERGY	0.851	N.A.
AUX. THERMAL ENERGY	N.A.	N.A.
AUX. ELECTRIC FUEL	0.007	N.A.
AUX. FOSSIL FUEL	0.002	N.A.
ELECTRICAL SAVINGS	0.003	N.A.
	N.A.	N.A.
	0.068	N.A.
	N.A.	N.A.
	*	N.A.

SYSTEM PERFORMANCE FACTOR:

SYSTEM TOTAL	0.993	MILLION BTU
PERCENT	*	PERCENT
	0.957	MILLION BTU
	0.115	MILLION BTU
	*	MILLION BTU
	*	MILLION BTU
	N.A.	MILLION BTU
	0.794	MILLION BTU
	N.A.	MILLION BTU

* DENOTES UNAVAILABLE DATA
 @ DENOTES NULL DATA
 N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
 OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
 SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SOLAR/1013-78/10

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND
REPORT PERIOD: OCTOBER, 1978

SITE/SYSTEM DESCRIPTION: CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING THE INSTALLATION. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT A SINGLE J-BOX AND SDAS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A SOLAR ASSISTED STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS 1000 GALLON HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT DOMESTIC HOT WATER HEATING RESISTANCE HEATING AND A HEAT PUMP, WHICH EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND ALL AUXILIARY SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY
18.266 GIGA JOULES
525698 KJ/SQ.M.
2.205 GIGA JOULES
63463 KJ/SQ.M.
11 DEGREES C
20 DEGREES C
0.06 GIGA JOULES
0.113 GIGA JOULES
0.121 GIGA JOULES

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE
AVERAGE BUILDING TEMPERATURE
AVERAGE SOLAR CONVERSION EFFICIENCY
ECSS OPERATING ENERGY
TOTAL SYSTEM OPERATING ENERGY
TOTAL ENERGY CONSUMED

SUBSYSTEM SUMMARY:

LCAD FRACTION USED
SOLAR ENERGY USED
OPERATING ENERGY
AUX. THERMAL ENG
AUX. ELECTRIC FUEL
AUX. FOSSIL FUEL
ELECTRICAL SAVINGS
FOSSIL SAVINGS

HEATING
0.140
0.132
0.008
0.002
0.003
N.A.
0.071
N.A.

COOLING
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.

SYSTEM TOTAL
1.048 GIGA JOULES
PERCENT
1.010 GIGA JOULES
0.121 GIGA JOULES
* GIGA JOULES
* GIGA JOULES
N.A. GIGA JOULES
0.838 GIGA JOULES
N.A. GIGA JOULES

SYSTEM PERFORMANCE FACTOR:

*

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)
SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND
REPORT PERIOD: OCTOBER, 1978

SOLAR/1013-78/10

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REFLECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	*	* 58	NOT APPLICABLE	NOT APPLICABLE	* 0.000	NOT	* 0.040
2	0.711	53			0.000		0.037
3	0.446	58			0.000		0.074
4	0.302	57			0.000		0.255
5	0.077	58			0.000		0.047
6	0.724	51			0.000		0.016
7	0.713	44			0.000		0.148
8	0.319	43			0.000		*
9	0.664	*			*		*
10	*	*			*		*
11	*	*			*		*
12	*	*			*		*
13	*	*			*		*
14	*	*			*		*
15	0.678	44			0.005		0.140
16	0.150	45			0.000		0.299
17	0.388	46			0.003		0.130
18	0.600	46			0.006		0.164
19	0.266	54			0.003		0.140
20	0.717	52			0.006		0.081
21	0.774	51			0.007		0.017
22	0.704	57			0.006		0.001
23	0.556	62			0.006		0.000
24	0.779	44			0.006		0.000
25	0.733	49			0.003		0.001
26	0.250	65			0.006		0.000
27	0.771	51			0.006		0.000
28	0.701	47			0.006		0.002
29	0.691	49			0.005		0.079
30	0.511	48			0.004		0.142
31	0.736	50			0.006		0.048
SUM	17.313	-	N.A.	N.A.	0.107	N.A.	-
AVG	0.558	51	N.A.	N.A.	0.003	N.A.	0.055
NBS ID	Q001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.

0 DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT COLLECTOR ARRAY PERFORMANCE

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND SOLAR/1013-78/10
REPORT PERIOD: OCTOBER, 1978

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	*	*	*	*	*
2	0.711	0.000	0.000	*	0.000
3	0.446	0.000	0.000	*	0.000
4	0.302	0.000	0.000	*	0.000
5	0.077	0.000	0.000	*	0.000
6	0.724	0.000	0.000	6C	0.000
7	0.713	0.000	0.000	57	0.000
8	0.319	0.000	0.000	*	0.000
9	0.664	0.000	0.000	*	0.000
10	*	*	*	*	*
11	*	*	*	*	*
12	*	*	*	*	*
13	*	*	*	*	*
14	*	*	*	*	*
15	*	*	*	*	*
16	0.678	0.521	0.124	53	0.183
17	0.150	0.000	0.000	53	0.000
18	0.388	0.247	0.048	53	0.124
19	0.600	0.526	0.121	57	0.202
20	0.266	0.188	0.021	58	0.081
21	0.717	0.652	0.183	60	0.256
22	0.774	0.701	0.190	66	0.222
23	0.704	0.639	0.156	73	0.245
24	0.556	0.489	0.079	76	0.142
25	0.779	0.682	0.133	50	0.171
26	0.733	0.627	0.093	58	0.126
27	0.250	0.168	-0.026	69	-0.102
28	0.771	0.680	0.143	56	0.185
29	0.701	0.620	0.103	59	0.147
30	0.691	0.562	0.101	59	0.146
31	0.511	0.371	0.055	55	0.108
	0.736	0.660	0.160	59	0.218
SUM	17.313	10.325	2.090	-	-
AVG	0.558	0.333	0.067	6C	0.121
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT STORAGE PERFORMANCE

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND SOLAR/1013-78/10
REPORT PERIOD: OCTOBER, 1978

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	*	*	-0.047	129	*
2	0.000	0.028	0.090	141	1.000
3	0.000	0.017	0.075	143	1.000
4	0.000	0.022	-0.045	137	1.000
5	0.000	0.020	-0.052	138	1.000
6	0.000	0.034	-0.073	142	1.000
7	0.000	0.011	-0.008	138	1.000
8	0.000	0.04	-0.064	140	1.000
9	0.000	*	0.102	*	*
10	*	*	*	*	*
11	*	*	*	*	*
12	*	*	*	*	*
13	*	*	*	*	*
14	*	*	*	*	*
15	*	*	*	*	*
16	0.124	0.095	-0.0C1	144	0.750
17	0.000	0.045	-0.053	138	1.000
18	0.048	0.05C	-0.001	134	1.076
19	0.121	0.099	-0.018	131	0.666
20	0.183	0.037	-0.049	129	-0.550
21	0.190	0.058	0.061	131	0.649
22	0.156	0.013	0.1C9	141	0.648
23	0.079	0.000	0.068	159	0.437
24	0.133	0.000	0.000	153	0.001
25	0.026	0.000	0.062	166	0.463
26	-0.143	0.000	-0.009	161	-0.09C
27	0.103	0.000	-0.088	159	3.432
28	0.101	0.002	0.025	165	0.423
29	0.055	0.054	-0.040	164	0.259
30	0.160	0.073	-0.081	156	0.145
31	0.160	0.035	0.035	152	-0.151
SUM	2.090	0.957	0.247	-	0.441
AVG	0.067	0.031	0.008	146	-
NBS ID	Q200	Q201	Q202		0.576
					N108

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT HOT WATER SUBSYSTEM

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND
REPORT PERIOD: OCTOBER, 1978
SOLAR/1013-78/10

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	* 0.033	* 60	* 0.028	* 0.009	* 0.009	* 0.009	NOT APPLICABLE		NOT APPLICABLE		* 115	* 81
2	0.018	67	0.017	0.009	0.009	0.009	NOT APPLICABLE		NOT APPLICABLE		115	42
3	0.019	81	0.022	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		116	46
4	0.025	84	0.020	0.005	0.005	0.005	NOT APPLICABLE		NOT APPLICABLE		114	60
5	0.030	86	0.034	0.002	0.002	0.002	NOT APPLICABLE		NOT APPLICABLE		114	77
6	0.010	87	0.011	0.003	0.003	0.003	NOT APPLICABLE		NOT APPLICABLE		116	23
7	0.044	92	0.047	0.006	0.006	0.006	NOT APPLICABLE		NOT APPLICABLE		115	108
8	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
9	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
10	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
11	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
12	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
13	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
14	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
15	*	*	*	*	*	*	NOT APPLICABLE		NOT APPLICABLE		*	*
16	0.046	96	0.045	0.009	0.009	0.009	NOT APPLICABLE		NOT APPLICABLE		118	209
17	0.038	44	0.032	0.045	0.045	0.045	NOT APPLICABLE		NOT APPLICABLE		116	983
18	0.041	38	0.035	0.032	0.032	0.032	NOT APPLICABLE		NOT APPLICABLE		117	839
19	0.046	41	0.037	0.037	0.037	0.037	NOT APPLICABLE		NOT APPLICABLE		117	97
20	0.071	46	0.058	0.058	0.058	0.058	NOT APPLICABLE		NOT APPLICABLE		118	148
21	0.016	16	0.013	0.013	0.013	0.013	NOT APPLICABLE		NOT APPLICABLE		115	33
22	0.000	00	0.000	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		116	10
23	0.000	00	0.000	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		116	0
24	0.000	00	0.000	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		116	0
25	0.000	00	0.000	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		116	0
26	0.000	00	0.000	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		117	0
27	0.000	00	0.000	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		117	0
28	0.000	00	0.000	0.000	0.000	0.000	NOT APPLICABLE		NOT APPLICABLE		117	0
29	0.047	47	0.054	0.002	0.002	0.002	NOT APPLICABLE		NOT APPLICABLE		120	239
30	0.072	72	0.073	0.054	0.054	0.054	NOT APPLICABLE		NOT APPLICABLE		124	139
31	0.030	30	0.035	0.073	0.073	0.073	NOT APPLICABLE		NOT APPLICABLE		121	60
SUM	C.879	-	0.851	*	*	*	N.A.	0.851	N.A.	-	-	1926
AVG	C.028	*	0.027	*	*	*	N.A.	0.027	N.A.	65	117	62
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND
REPORT PERIOD: OCTOBER, 1978

SOLAR/1C13-78/10

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	* 0.000	* 0	* 0.000	* 0.001	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 69	* 58
2	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	69	53
3	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	71	58
4	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	70	57
5	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	70	58
6	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	68	51
7	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	66	44
8	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	65	43
9	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
10	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
11	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
12	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
13	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
14	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
15	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
16	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
17	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
18	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
19	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
20	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
21	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
22	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
23	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
24	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
25	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
26	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
27	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
28	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
29	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
30	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
31	* 0.000	* 0	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 0.000	* 65	* 44
SUM	0.132	-	0.125	0.007	0.002	0.003	N.A.	0.068	N.A.	-	-
AVG	0.004	94	0.004	0.000	0.000	0.000	N.A.	0.002	N.A.	69	51
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
0 DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENVIRONMENTAL SUMMARY

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND
REPORT PERIOD: OCTOBER, 1978

SOLAR/1013-78/10

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	1902	NOT	58	*	NOT	NOT	NOT
2	1193	APPLICABLE	53	*	APPLICABLE	APPLICABLE	APPLICABLE
3	806		58	*			
4	206		57	*			
5	1936		58	60			
6	1906		51	63			
7	853		44	57			
8	1777		43	*			
9	*		*	*			
10	*		*	*			
11	*		*	*			
12	*		*	*			
13	*		*	*			
14	*		*	*			
15	1814		44	53			
16	401		45	53			
17	1038		46	53			
18	1604		46	57			
19	711		54	58			
20	1917		52	60			
21	2070		51	66			
22	1887		57	73			
23	1487		62	76			
24	2083		44	50			
25	1961		49	58			
26	669		65	69			
27	2062		51	56			
28	1874		47	60			
29	1848		49	59			
30	1366		48	55			
31	1968		50	59			
SUM	46293	N.A.	-	-	-	-	-
AVG	1493	N.A.	51	60	N.A.	N.A.	N.A.
NBS ID	0001		N113			N115	N114

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT THERMODYNAMIC CONVERSION EQUIPMENT

SITE: J.D. EVANS, INC. HOUSE B, COLUMBIA, MARYLAND SOLAR/1013-78/10
REPORT PERIOD: OCTOBER, 1978

DAY OF MONTH	EQUIPMENT LOAD MILLION BTU	THERMAL ENERGY INPUT MILLION BTU	OPERATING ENERGY MILLION BTU	ENERGY REJECTED MILLION BTU	COEFFICIENT OF PERFORMANCE (SEE NOTE)
1	*	*	NOT	NOT	*
2	0.000	0.000	APPLICABLE	APPLICABLE	0.000
3	0.000	0.000			0.000
4	0.000	0.000			0.000
5	0.000	0.000			0.000
6	0.000	0.000			0.000
7	0.000	0.000			0.000
8	0.000	0.000			0.000
9	0.000	0.000			0.000
10	*	*			*
11	*	*			*
12	*	*			*
13	*	*			*
14	*	*			*
15	*	*			*
16	0.000	0.000			0.000
17	0.000	0.000			0.000
18	0.006	0.002			0.000
19	0.000	0.000			0.000
20	0.000	0.000			0.000
21	0.000	0.000			0.000
22	0.000	0.000			0.000
23	0.000	0.000			0.000
24	0.000	0.000			0.000
25	0.000	0.000			0.000
26	0.000	0.000			0.000
27	0.000	0.000			0.000
28	0.000	0.000			0.000
29	0.000	0.000			0.000
30	0.000	0.000			0.000
31	0.000	0.000			0.000
SUM	0.007	0.003	*	*	0.000
AVG	0.000	0.000	*	*	0.000

* DENOTES UNAVAILABLE DATA.
a DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.
NOTE:

UNIVERSITY OF FLORIDA



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